Run_swarm.m

This is the main driver for the program. Run_swarm accepts rules: **nswarm** and **range_space** as inputs. The output is *agents*. The variable rules are the number of species in the model, but for simplicity the code work is currently set for 1 species of bird-oids – this can later bet modified.

Ininitialize_agents.m

This function takes **nswarm**, **range_space**, and the rules generated by **run_swarm.m** and initicializes the agents position and velocity.

Move_boids.m

This function takes *agents* as *rules* as the input and computes the boids' movement. First, the neighbords are calculated in the neighborhood function and if this function is empty, it assigns a random velocitiy. Otherwise, three rules get passed: cohesion, separation and alignment. Cohesion keeps the boids together by pulling them towards the average position of the boid flock. Seperation ensures proper spacing between boids, while alignment controls the individual boid velocity with the neighboring boid velocity.

Neighborhood.m

This function calculates the Euclidean distance between each vector and returns a neighbor if it is within a certain neighborhood radius.

Viewing_angle.m

Takes *agents, b* and *neighbor* as input and calculates the angle between two vectors.

Update_plot.m

This function takes the time, *t*, average positions and the agent matrix as input and plots the boids in a 3D scatter plot. The axes are continually updates so the boids do not "fly" off screen.